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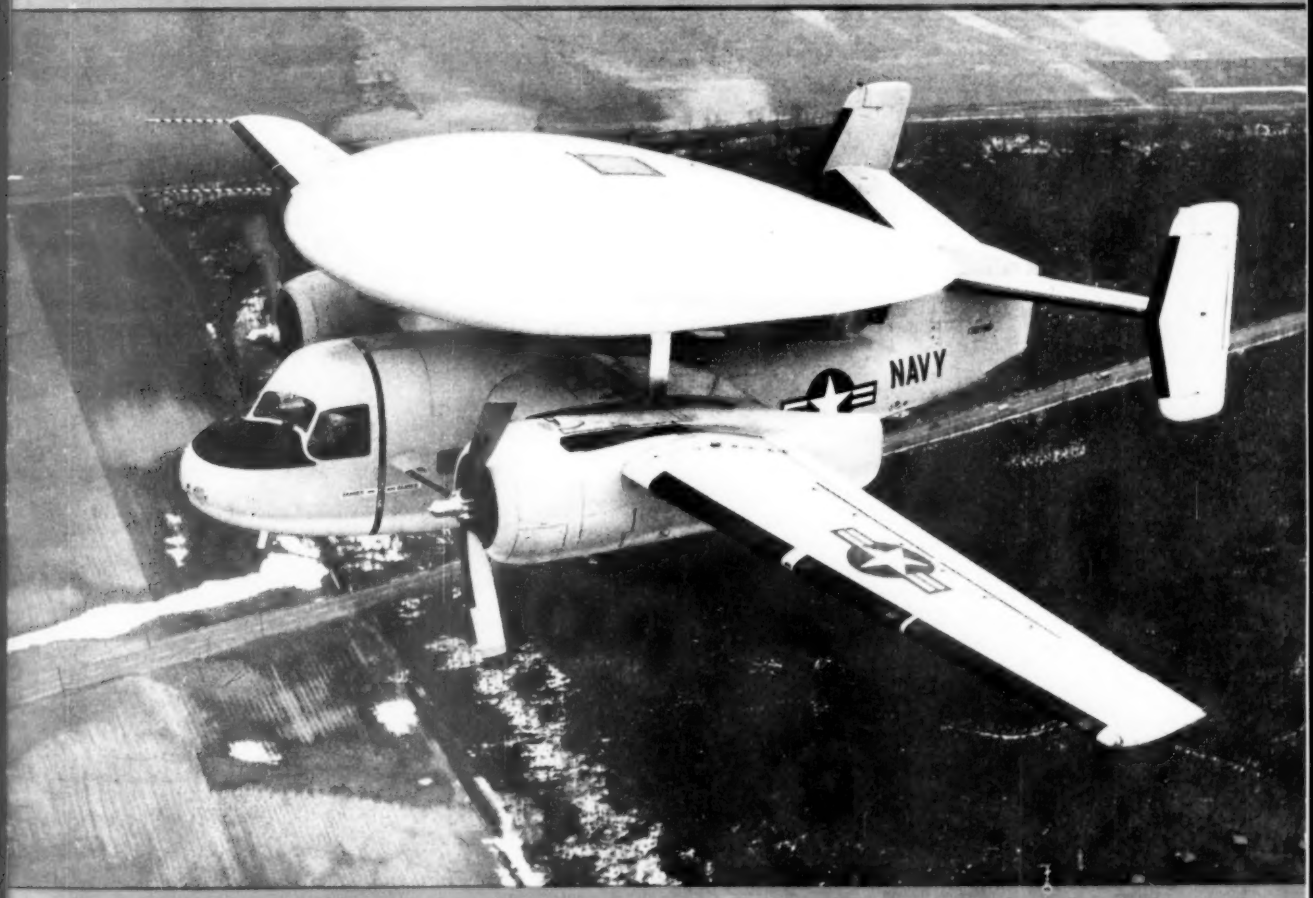
# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE




"Flying Saucer"

See Page 230

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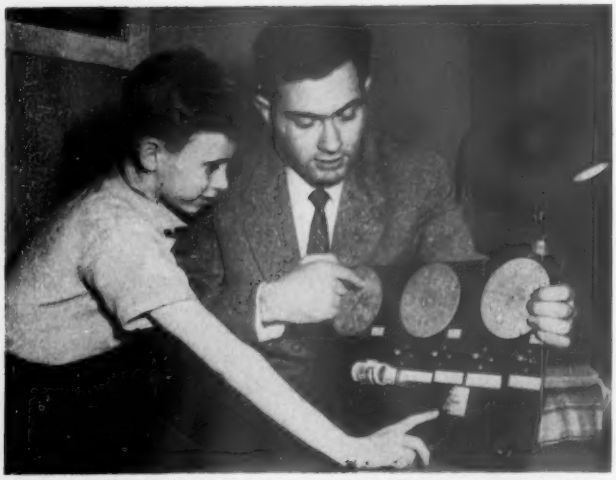

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RADIO ASTRONOMY

# "Maser" Aids Astronomers

**A ten-carat synthetic ruby made to oscillate at microwave frequencies may be able to increase the sensitivity of radio telescopes one hundred-fold.**

➤ A DEVICE that will increase by 100 times the listening sensitivity of radio telescopes is now being installed on the Naval Research Laboratory's 50-foot antenna located in Washington, D. C.

Radio telescopes provide a means of studying the sun, planets and far-away galaxies by tuning in on the radio waves broadcast by these heavenly objects.

The device, known as a "maser," is a ten-carat synthetic ruby that is made to oscillate at microwave frequencies. If the instrument works successfully, it will be the first known time a maser has been used on a radio telescope.

Maser devices developed so far operate only at very low temperatures, about 455 degrees below zero Fahrenheit. The principle on which they work was first demonstrated for beams of molecules in gases in 1954 by Dr. C. H. Townes and his co-workers at Columbia University.

They coined the word "maser," which stands for "microwave amplification by stimulated emission of radiation." Dr. Townes is working with Naval Research Laboratory scientists on applying the maser to a radio telescope.

One of the first objects the NRL's radio telescope will be trained on is Saturn. As yet, no radio waves have been detected from this ringed planet. But C. H. Mayer told SCIENCE SERVICE that NRL scientists expected "no difficulty" in picking up Saturn's radio broadcasts at a wavelength of three centimeters, or slightly more than one inch.

Radio waves have previously been detected from Mars, Venus and Jupiter at this same wavelength by the NRL team, which includes Mr. Mayer, T. P. McCullough and R. M. Sloanaker.

The NRL scientists will also try to record the radio waves from Mercury, but believe they have less chance of hearing that planet's broadcasts.

One outstanding characteristic of masers is their very low "noise" level compared to conventional microwave equipment. Because the radio waves broadcast by most heavenly objects are so very weak, the noise level of the equipment severely limits the radio sources that can be detected. By reducing this noise level by a factor of ten, maser-equipped radio telescopes can scan a volume of space 30 times larger than possible with conventionally equipped antennas.

Scientists at Harvard College Observatory are also working on a maser device to attach to their radio telescope, and have operated it successfully in the laboratory at a wavelength of 21 centimeters.

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*ANCIENT AND NEW WRITINGS—Father Roberto Busa, foreground, and Paul Tasman of IBM World Trade Corporation, examine a scroll.*

## ● RADIO

**Saturday, April 19, 1958, 1:30-1:45 p.m., EST**

**"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio network. Check your local CBS station.**

**Mr. Mike Gorman, executive director, National Committee Against Mental Illness, Washington, D.C., will discuss "The Fight Against Mental Illness."**

ARCHAEOLOGY

# "Togetherness" Old; Was in Dead Sea Scrolls

➤ THE WORD "togetherness" for which there is such a modern flair these days was in use back at the beginning of the Christian era by an ancient Hebrew religious order, the Essenes.

This is shown in a comprehensive index to the non-Biblical part of the famous Dead Sea Scrolls. The index, which was made by electronic computer, contains some 29,245 entries. It is more than an aid to scholars in locating particular references in the ancient parchment documents; it is also a great help to them in interpreting the documents and understanding the ancient people who wrote them.

The old Hebrew word "Yakum," which means togetherness, appears only once in all of the Bible. It appears several times, however, in ancient Rabinical writings and several times also in the account of the Essenes by the first century historian, Josephus. Now the index reveals that the word occurred many times in the Dead Sea Scrolls.

The Dead Sea Scrolls were found by a Bedouin shepherd boy in a cave near the northern end of the Dead Sea where they had been hidden for safe keeping by monks of a Jewish religious order, the Essenes. One of the scrolls, included in the new computer-made index, is the "Manual of Discipline" of that order.

The scrolls now indexed were written over a period of 600 years. They are in three languages, Aramaic, Nabataean and Old Hebrew. The index which might have taken scholars many painstaking years of work to complete was done by the International Business Machines Corporation electronic brain in about three hours of running time. It is now contained on two reels of magnetic tape.

One of the ways in which the index can aid scholars is in providing new understanding of ancient words. When a scholar is trying to interpret the meaning of a word, he can use the index to see in what context the word was used each time it appeared in the manuscript and thus can modify his idea of its meaning to the ancient writers.

The new aid to scholars was demonstrated by Dr. James Muilenburg of the Union Theological Seminary, New York, authority on the Dead Sea Scrolls, and Father Roberto Busa, Italian scholar who is connected with the first literary data processing center at Aloisianum, Gallarate, Italy.

Science News Letter, April 12, 1958

PUBLIC SAFETY

# Sue U. S. to Stop A-Tests

**A group that includes scientists, as well as a philosopher, an editor and interested laymen, has filed suit against the United States to seek a halt in our nuclear tests.**

➤ A SUIT has been filed to seek a halt to nuclear tests by the United States. Similar suits are planned by the same plaintiffs against Russia and Great Britain.

Defendants in the American suit are Secretary of Defense Neil H. McElroy, and Chairman Lewis L. Strauss and Commissioners Dr. Willard F. Libby, Harold S. Vance, John S. Graham and John F. Floberg of the Atomic Energy Commission. They were named by the plaintiffs as "the six Government officials directly responsible for the tests."

At the same time the suit was filed in the Federal Court of the District of Columbia, a formal complaint was forwarded to R. A. Rudenko, Procurator-General of the U.S.S.R., in Moscow. The attorneys for the action will try to travel to Russia to press their case there.

Plaintiffs in the suit include three distinguished scientists, a world-famous philosopher, two leaders in the cause of peace, a world health expert, a housewife, an editor and three Japanese fishermen.

The complaint in the U.S. suit calls on the court to order the end of fallout-producing nuclear explosions on grounds that:

1. The defendants are acting beyond the authority granted by the Atomic Energy Act of 1954.

2. The Congress has unlawfully delegated legislative powers to the defendants.

3. The Act is unconstitutional because it violates the due process clause of the Fifth Amendment.

4. The Congress has no power to enact legislation by which human lives are endangered.

5. The Act violates the human rights provisions of the United Nations Charter, to which the United States is a party.

The plaintiffs point out that although international agreement is the most effective way of ending all nuclear explosions, in the absence of such agreement, "individuals affected by fallout have no recourse except to resort to the courts in the nations that continue detonations."

All the suits, which will vary in detail only as far as is necessary to conform to the different constitutional patterns of each country, "will prove that fallout causes immediate and future increase in genetic damage, tendencies to bone cancer and leukemia, and general shortening of the life-span in the world population."

None of the suits seeks compensation for damage from past detonations, nor do they aim at stopping further laboratory research.

Although Russia announced that it was willing to suspend nuclear tests, the plaintiffs explain there are loopholes in the announcement and only a final decree from the highest court in the Soviet Union would assure a permanent halt to tests.

The idea of taking court action to end tests and subsequent fallout was initiated by a young Quaker from Pasadena, Calif., David Walden. Dr. Linus Pauling, Nobelist and professor of chemistry at the California Institute of Technology, expressed interest. So did a Bloomfield, Conn., housewife, Mrs. Stephanie May, a cofounder of the Connecticut Committee to Halt Nuclear Tests. Others joined and the suit, along with the two proposed, is the outcome. Each plaintiff is acting as a private citizen.

The U.S. suit charges specifically that nuclear detonations "resulted and will result in world-wide exposure of human beings to radiation in addition to that of natural background radiation and to the X-ray radiation resulting from the healing arts and industry. The past and threatened future acts of the defendants did and will cause a world-wide fallout of radioactive debris, did and will increase the radioactive strontium content of the soil and the amount of contamination of the food supply of the world and of the bones of human beings."

It alleges that the defendants' "past and threatened future acts of exploding nuclear weapons did and will cause the plaintiffs to be damaged genetically and somatically; will cause their progeny to be deleteriously affected because of the additional radiation brought about by the acts of the defendants, and, with high probability, did and will cause the plaintiffs to suffer various diseases which they would not suffer but for the additional radiation brought about by the acts of the defendants."

It also charges that nuclear explosions during the last seven years have produced "some thousands or tens of thousands of seriously defective children," with a similar number expected from the detonation of a single nuclear weapon of high yield. It considers a "high probability" that such explosions will produce cases of leukemia and bone cancer leading directly to thousands or tens of thousands of deaths.

The suit is expected to have a profound effect on international and constitutional law. Research on the part of the plaintiffs' attorneys has revealed that the legal systems of the U.S., U.S.S.R. and Great Britain contain, either in unwritten common law precedents or in statutory codes, a substantial basis for a suit against the officials directly responsible for the tests.

The plaintiffs, in addition to Dr. Pauling and Mrs. May, are: Dr. Karl Paul Link, professor of biochemistry at the University of Wisconsin; Dr. Leslie C. Dunn, professor of zoology at Columbia University; Norman Thomas, New York City, longtime leader of the Socialist Party; William Bross Lloyd Jr., of Chicago, editor of Toward Freedom, a publication on Africa; Dr. Brock Chisholm of Victoria, British Columbia, former director of the World Health Organization; Toyohiko Kagawa, of Tokyo; Hiroaki Nakatani, captain of vessels that fish in the Pacific; Takaaki Tsurui, owner of the Eleventh Katori Maru; Yaeji Matsushita, chief engineer of the Eleventh Katori Maru; Bertrand Russell, Nobel-Prize winning philosopher; the Rev. Canon L. John Collins, of St. Paul's Cathedral, London; the Rev. G. Michael Scott, Church of England.

The suit was filed by Francis Heisler of Carmel, Calif., and A. L. Wirin of Los Angeles.

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EDUCATION

# Revise Role of Teacher

**The science teacher's most important role, says a leading anthropologist, is to interest the student in the process of scientific investigation.**

➤ STUDENTS who seem to be potential scientists should be given an opportunity to work with scientists.

The entire role of the science teacher needs to be reconsidered, Dr. Margaret Mead, world-famous author and anthropologist, told the educators meeting in Denver, Colo., for the Sixth Annual Convention of the National Science Teachers Association.

The science teacher today is expected to be a model of two kinds of people simultaneously: a scientist concerned with research and a teacher concerned with teaching, Dr. Mead said. But boys, who are believed to be the appropriate sex from which scientists and engineers will come, tend to identify themselves with male teachers. This tends to overstress the identification factor.

The appropriate role of the science teacher is to interest a student, not in being a scientist by identification, but in the process of scientific investigation, Dr. Mead declared.

Male teachers who prefer to teach other subjects, but have been induced to teach science, must be rescued. There should be a reinforcing of those women good in mathematics and physics, who have been diverted from science teaching because they are females.

"The most frequent negative comment from students, 'I am not interested in science' is found to mean 'this is something which I can do nothing with.' Boredom, apathy and active rejection follow an inability to do, use, and make sense of something in a culture where learning is by doing."

Outlining the plan being developed by Watson Davis of SCIENCE SERVICE for a science youth information service to put the isolated, gifted child in touch with working scientists in his area, through the mechanism of committees of regional science fairs, Dr. Mead expressed the opinion that this plan "combines all the advantages of our large population and mass communications with the need for face-to-face apprenticeship relationships between present and future scientists."

Students react strongly against a disliked science teacher.

They take a good teacher for granted, Dr. Mead said.

Increasing the recognition and respect accorded the science teacher is empty exhortation unless it is accompanied by a widening of his role in the eyes of his students, the students' parents, and the scientific leaders in the community.

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AERONAUTICS

# Plan New Space Agency

➤ THE FEDERAL research organization in aeronautics, in existence since World War I as the National Advisory Committee for Aeronautics (NACA), is either in danger of becoming a victim of the present "space" furore, or it will become the nucleus of a new major expanded research effort of great promise.

President Eisenhower in recommending to Congress the establishment of a National Aeronautics and Space Agency, which would absorb the NACA, contemplates changing the organizational method that has proved successful over 43 years in keeping America at the forefront of aeronautical research.

Leading authorities, by virtue of position in the Government or because of scientific and technical eminence, constitute the NACA and serve without compensation. The NACA has a competent technical staff and three extensive research laboratories in Virginia, California and Ohio, with additional test stations.

The new Eisenhower proposal, following the March 26 "Introduction to Outer Space" report of the President's Science Advisory Committee, is viewed as a step to soft pedal wild-eyed military aspects of outer space. While the organizational set-up would be changed, the competence and skill of the NACA would be augmented and applied to new problems.

The NACA in a report issued in January listed as major research fields: space mechanics, space environment, energy resources, propulsion systems, vehicle configuration and structure, materials, launch, rendezvous, re-entry and recovery, communication, navigation and guidance, space biology, flight simulation and measurement and observation techniques.

Expanded facilities and staff, a greatly expanded contract research program and new laboratories also were proposed. (See SNL, Jan. 11, p. 22.)

The new agency proposed would seem to make possible the realization of such plans. In addition to accelerating research, the new agency would also make some person or group responsible for performance in the space field as well as the advance of aeronautics.

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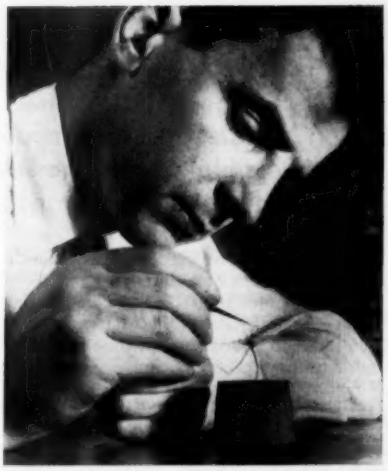

*TRANSISTOR-AMPLIFIER — J. F. Dewald of Bell Telephone Laboratories examines a laboratory model of his invention, the new transistor amplifier that uses an electrolyte-semiconductor interface.*

NUTRITION

## Americans Change Taste For Vegetables

➤ AMERICAN TASTE for television and pizza is causing changes in the vegetable market, the U. S. Department of Agriculture has reported.

Prepared frozen dinners and pot pies have accounted for a good share of the frozen peas consumption, which rose from 6% to 31% since 1941. The increased popularity of Italian-style dishes such as pizza and spaghetti has caused a 159% increase in tomato pulp, puree and sauce consumption.

These two, peas and tomatoes, are also representative of changes taking place with many other vegetables: Consumer preference for frozen and canned vegetables has grown at the expense of the fresh vegetable market.

In addition to changes in packaging, the average American's taste in vegetables is changing. More corn, lettuce, cucumbers, lima beans, garlic, broccoli, carrots and Brussels sprouts are being eaten today than 10 or 15 years ago.

However, less cauliflower, egg plant, spinach, onions, cabbage, asparagus and artichokes, are eaten. Beets, snap beans, peppers, peas, celery and kale seem to be holding their own on the consumer's vegetable list.

The switch from fresh to processed vegetables is also causing a shift in the location of production. California now produces 40% of the national output of tomatoes, while the West as a whole has increased its share of U. S. production from 26% to 37%. States that produced mostly for the fresh market during the prewar period have sharply decreased production where they were unable to shift to production for canning or freezing.

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MEDICINE

# Study Cancer Regression

**Studies of spontaneous regression of tumors point to many possible causes; however, few cases can be said to actually disappear spontaneously, doctors warn.**

➤ THE RESULTS of an extensive clinical study of the spontaneous regression of tumors in humans has resulted in plans to begin experimental reproduction of the same conditions in animals to examine better the mechanisms of cancer control.

A preliminary report, published in the *Annals of Surgery* (Sept. 1956), showed that of 600 reported cases of spontaneous regression of tumors, only 47 proved to be valid. Therefore, further studies and groupings were called for. Now, 101 cases, out of 1,000 reported, are the subject of this clinical study.

It was found independent factors could be responsible for the spontaneous regression, Dr. Tilden C. Everson, clinical associate professor of surgery at the University of Illinois Medical School, has reported.

They include: endocrine or hormone influences; surgical removal of a tumor, which can lead to destruction of other surrounding tumor cells; unusual sensitivity to inadequate radiation; acute infection; allergic reaction; interference with nutrition of the tumor; removal of the cancer-causing agent; and incorrect microscopic diagnosis of malignancy. It was found that in many instances of those cases where malignancy was reported and spontaneous regression occurred, the tumor was actually benign, Dr. Everson told science writers on a tour sponsored by the American Cancer Society.

Explaining the possibility of removal of a carcinogenic agent, he cited the nine cases of accurate tumor diagnosis of the bladder. This meant removal of the bladder after the urine was rerouted through the colon. When the bladder was removed several weeks after the rerouting, it was found that all traces of the tumor had regressed.

This could possibly have been due to some carcinogenic agent in the urine. However, no tumors then developed in the colon. This, in turn, could illustrate a certain sensitivity in the bladder tissue not present in the colon. Urine samples were not taken prior to bladder removal.

These clinical studies point the way to examination of spontaneous regression in cancerous laboratory animals to find what makes this "magic" disappearance occur.

In conclusion, Dr. Everson cautioned, the most important aspect of the study appeared to be the fact that so few tumor cases actually regressed spontaneously. He warned people should not rely on such an unlikely occurrence as spontaneous regression.

➤ HOW THE LYMPHATIC system, one of the biggest cancer spreaders throughout the body, distributes and moves particles along its complicated network, has been described.

A study of the factors influencing the spread of disease through the lymph nodes revealed muscular activity is important in propelling the materials in the lymphatics. Certain enzymes, such as hyaluronidase, increase the speed and amount of pick-up.

The method by which these factors were finally measured was devised by Dr. Harold H. Sage, of New York City. He injected radioactive gold, in colloidal suspension, into the arm of patients. A radiation detector counter picked up the functional pattern of the gold particles as they passed through the body.

These pick-ups were then transformed into a graph that provided a continuous time record of each particle as it was picked up by a lymph node, the doctor said.

Both human and animal studies have been performed on nodes of both upper and lower extremities and the head and neck.

Before this method was devised, it was impossible to study the patterns of particles through the nodes. With this new technique, he said, quantitative amounts of disease spread can also be measured.

Many times, blockage of lymph nodes results from surgical scar, edema, radiation scar and cancer. When cancer is in the node itself, the node must be removed. Paradoxically, this node removal results in the necessary removal of a disease barrier. This removal can harm the patient because the body normally relies on nodes to stop disease spread.

Dr. Sage cited the example of breast removal. The nodes of the area are also removed because usually they also carry cancer cells. Doctors in the future hope to be able to transplant successfully nodes to replace those that must be removed, he said.

Previous to Dr. Sage's work, no one was able to study the direct movement of lymphatic spread. Doctors hope to be able to use this method to help stop the flow of cancer cells in the body by detecting their movement along the lymphatic system before the cells become hopelessly imbedded. This method may eventually also guide the surgeon who is removing a malignant tumor, Dr. Sage predicted.

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AERONAUTICS

## Navy Plane Extends Radar Warning Line

**See Front Cover**

➤ THE FIRST production model of the WF-2 Tracer, a saucer-topped early-warning plane designed for Navy carrier operations, has had a successful first flight, Grumman Aircraft Engineering Corporation announced.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows the plane and its huge radome, which houses long-range detection equipment.

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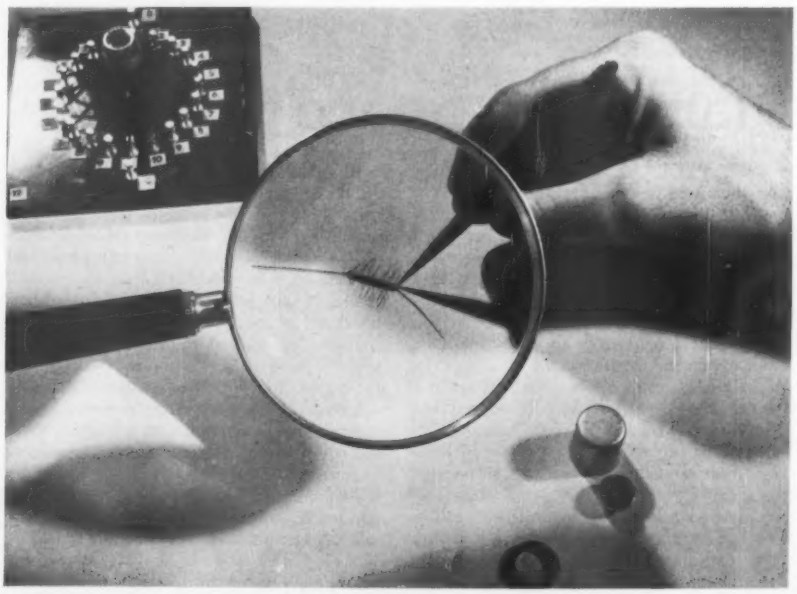

*ULTRA-MINIATURE DEVICE—Under the magnifying glass is an experimental shift register transistor, developed by the Radio Corporation of America. Operation of it in the laboratory has shown the feasibility of integrating active and passive elements of a circuit. A testing unit appears at the upper left, while parts of a capsule in which an experimental unit may be enclosed appears at the lower right.*

PUBLIC HEALTH

# Hospital Infection Grows

**Strict aseptic procedures, greater care in sterilizing and laundering hospital bedding and less indiscriminate use of antibiotics are needed to control hospital infections.**

➤ STAPHYLOCOCCAL infections originating in hospitals and spreading to the community are becoming increasingly severe and frequent. The recent outbreaks that took the lives of 25 babies in Houston and Dallas, Texas, are tragic proof.

The hospital nursery is one of the primary sources of infection by new strains of these bacteria that are highly resistant to many antibiotics. Doctors state, however, that application of well-known sterilization techniques can control future outbreaks of serious epidemics.

Often the disease is overlooked as a cause of death.

In a survey of hospitals in Seattle, Wash., more than 100 of the 7,837 deaths that occurred in Seattle-King county in 1956 could be attributed to staphylococcal infections. But only four official death certificates recorded these commonly found bacteria as the cause of death.

This is reported by Dr. Reimert Ravenholt and Otto H. Ravenholt in the *American Journal of Public Health* (March). The investigators find that deaths from staphylococcal infection occur most commonly in infants and older patients with low resistance. Staphylococcal pneumonia is the most common cause of death. The discrepancy in mortality statistics and the estimates of these investigators comes about because most physicians do not attempt in post mortem examinations to identify the organism causing death. Virulent staphylococcal diseases are usually acquired in the hospital and are considered only as complications of the disease that caused the patient to enter the hospital rather than as primary cause of death.

Normally staphylococci cause such common infections as boils, infant impetigo, carbuncles and other similar superficial disorders, but they can also kill.

The bacteria have been known since the inception of surgery as a major cause of post-operative infection, but by using aseptic procedures developed many years ago by Lister and other early investigators, this type of infection has been reduced to a minor problem.

The outbreaks in Seattle hospitals, and typical of other locations across the country, frequently originate in the nursery. Newborn infants become infected from contaminated air, contaminated linen or by contact with hospital personnel who may be carriers without showing symptoms. The infants pass the infection to mothers while breast feeding. At the same time rapid cross infection from one infant to another may occur. This has been noticeable when the virulent antibiotic resistant strains of the bacteria have been responsible.

The situation is further complicated in the majority of cases involving mothers and nursing children because infection does not appear until after the patients are discharged from the hospital.

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It further stated that there had been a tendency to relax vigorous aseptic "housekeeping" practices in hospitals largely because of the effectiveness of the antibiotics in combating infection. It emphasized the need for all hospital administrators and medical personnel to improve current procedures in order to maintain aseptic conditions at all times.

The detection of the particular strains of "Staph" that have been shown to be the causal agent in these epidemic outbreaks is a highly complicated procedure. Recognizing that most community hospitals do not have laboratory facilities for adequate identification, the U. S. Public Health Service has offered to assist in analyzing specific problems as they arise.

Detection of the presence of the particular strain of the bacterium is especially important in preventing serious outbreaks because if preventive measures are delayed until numerous cases appear in the hospital, the epidemic is well-established and is particularly difficult to bring under control.

Other preventive measures presented at the AMA symposium included careful checks on sterilizing and laundry procedures to remove or destroy any bacteria that might be on contaminated bedding; checks on personnel to be sure that no carriers of the bacteria, who might not show symptoms, were assigned to nursery duty; return to strict aseptic procedures in all hospital operations including wound dressing and also scrub-up by personnel; and discouragement of the indiscriminate use of antibiotics which, it was conceded, has done more than anything else to bring about the existence of the resistant strains.

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MEDICINE

# Study Cancer Regression

**Studies of spontaneous regression of tumors point to many possible causes; however, few cases can be said to actually disappear spontaneously, doctors warn.**

➤ THE RESULTS of an extensive clinical study of the spontaneous regression of tumors in humans has resulted in plans to begin experimental reproduction of the same conditions in animals to examine better the mechanisms of cancer control.

A preliminary report, published in the *Annals of Surgery* (Sept. 1956), showed that of 600 reported cases of spontaneous regression of tumors, only 47 proved to be valid. Therefore, further studies and groupings were called for. Now, 101 cases, out of 1,000 reported, are the subject of this clinical study.

It was found independent factors could be responsible for the spontaneous regression, Dr. Tilden C. Everson, clinical associate professor of surgery at the University of Illinois Medical School, has reported.

They include: endocrine or hormone influences; surgical removal of a tumor, which can lead to destruction of other surrounding tumor cells; unusual sensitivity to inadequate radiation; acute infection; allergic reaction; interference with nutrition of the tumor; removal of the cancer-causing agent; and incorrect microscopic diagnosis of malignancy. It was found that in many instances of those cases where malignancy was reported and spontaneous regression occurred, the tumor was actually benign, Dr. Everson told science writers on a tour sponsored by the American Cancer Society.

Explaining the possibility of removal of a carcinogenic agent, he cited the nine cases of accurate tumor diagnosis of the bladder. This meant removal of the bladder after the urine was rerouted through the colon. When the bladder was removed several weeks after the rerouting, it was found that all traces of the tumor had regressed.

This could possibly have been due to some carcinogenic agent in the urine. However, no tumors then developed in the colon. This, in turn, could illustrate a certain sensitivity in the bladder tissue not present in the colon. Urine samples were not taken prior to bladder removal.

These clinical studies point the way to examination of spontaneous regression in cancerous laboratory animals to find what makes this "magic" disappearance occur.

In conclusion, Dr. Everson cautioned, the most important aspect of the study appeared to be the fact that so few tumor cases actually regressed spontaneously. He warned people should not rely on such an unlikely occurrence as spontaneous regression.

➤ HOW THE LYMPHATIC system, one of the biggest cancer spreaders throughout the body, distributes and moves particles along its complicated network, has been described.

A study of the factors influencing the spread of disease through the lymph nodes revealed muscular activity is important in propelling the materials in the lymphatics. Certain enzymes, such as hyaluronidase, increase the speed and amount of pick-up.

The method by which these factors were finally measured was devised by Dr. Harold H. Sage, of New York City. He injected radioactive gold, in colloidal suspension, into the arm of patients. A radiation detector counter picked up the functional pattern of the gold particles as they passed through the body.

These pick-ups were then transformed into a graph that provided a continuous time record of each particle as it was picked up by a lymph node, the doctor said.

Both human and animal studies have been performed on nodes of both upper and lower extremities and the head and neck.

Before this method was devised, it was impossible to study the patterns of particles through the nodes. With this new technique, he said, quantitative amounts of disease spread can also be measured.

Many times, blockage of lymph nodes results from surgical scar, edema, radiation scar and cancer. When cancer is in the node itself, the node must be removed. Paradoxically, this node removal results in the necessary removal of a disease barrier. This removal can harm the patient because the body normally relies on nodes to stop disease spread.

Dr. Sage cited the example of breast removal. The nodes of the area are also removed because usually they also carry cancer cells. Doctors in the future hope to be able to transplant successfully nodes to replace those that must be removed, he said.

Previous to Dr. Sage's work, no one was able to study the direct movement of lymphatic spread. Doctors hope to be able to use this method to help stop the flow of cancer cells in the body by detecting their movement along the lymphatic system before the cells become hopelessly imbedded. This method may eventually also guide the surgeon who is removing a malignant tumor, Dr. Sage predicted.

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AERONAUTICS

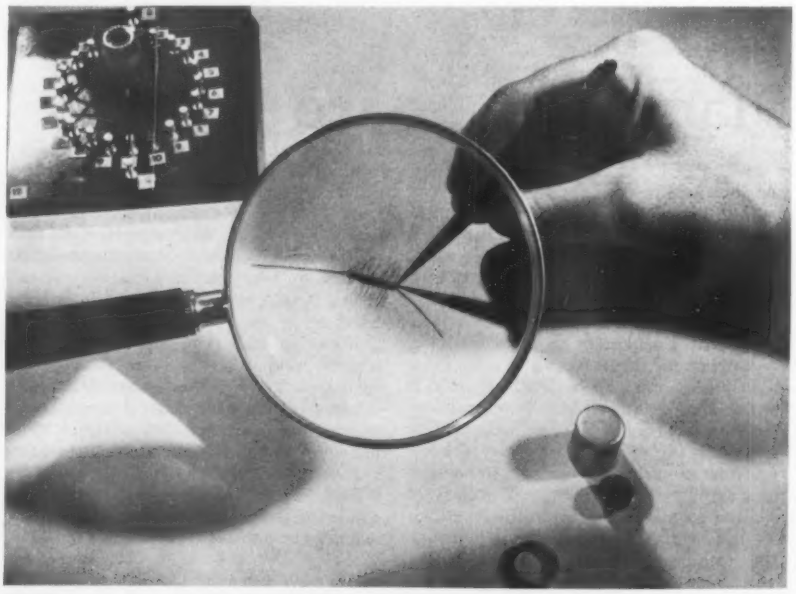
## Navy Plane Extends Radar Warning Line

**See Front Cover**

➤ THE FIRST production model of the WF-2 Tracer, a saucer-topped early-warning plane designed for Navy carrier operations, has had a successful first flight, Grumman Aircraft Engineering Corporation announced.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows the plane and its huge radome, which houses long-range detection equipment.

Science News Letter, April 12, 1958



*ULTRA-MINIATURE DEVICE—Under the magnifying glass is an experimental shift register transistor, developed by the Radio Corporation of America. Operation of it in the laboratory has shown the feasibility of integrating active and passive elements of a circuit. A testing unit appears at the upper left, while parts of a capsule in which an experimental unit may be enclosed appears at the lower right.*

PUBLIC HEALTH

# Hospital Infection Grows

**Strict aseptic procedures, greater care in sterilizing and laundering hospital bedding and less indiscriminate use of antibiotics are needed to control hospital infections.**

➤ STAPHYLOCOCCAL infections originating in hospitals and spreading to the community are becoming increasingly severe and frequent. The recent outbreaks that took the lives of 25 babies in Houston and Dallas, Texas, are tragic proof.

The hospital nursery is one of the primary sources of infection by new strains of these bacteria that are highly resistant to many antibiotics. Doctors state, however, that application of well-known sterilization techniques can control future outbreaks of serious epidemics.

Often the disease is overlooked as a cause of death.

In a survey of hospitals in Seattle, Wash., more than 100 of the 7,837 deaths that occurred in Seattle-King county in 1956 could be attributed to staphylococcal infections. But only four official death certificates recorded these commonly found bacteria as the cause of death.

This is reported by Dr. Reimert Ravenholt and Otto H. Ravenholt in the *American Journal of Public Health* (March). The investigators find that deaths from staphylococcal infection occur most commonly in infants and older patients with low resistance. Staphylococcal pneumonia is the most common cause of death. The discrepancy in mortality statistics and the estimates of these investigators comes about because most physicians do not attempt in post mortem examinations to identify the organism causing death. Virulent staphylococcal diseases are usually acquired in the hospital and are considered only as complications of the disease that caused the patient to enter the hospital rather than as primary cause of death.

Normally staphylococci cause such common infections as boils, infant impetigo, carbuncles and other similar superficial disorders, but they can also kill.

The bacteria have been known since the inception of surgery as a major cause of post-operative infection, but by using aseptic procedures developed many years ago by Lister and other early investigators, this type of infection has been reduced to a minor problem.

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ANTHROPOLOGY

## Languages Molded By Experiences

➤ THE ESKIMOS have no word for snow.

Dr. Harry Hoijer, professor of anthropology at the University of California at Los Angeles, used this fact as an illustration to demonstrate how experience molds languages and vice versa.

"The Eskimos do have a number of words relating to snow surface," he said, "because their experiences relate more to the structuring of the snowy landscape."

Another example: the Navajos have no word that means specifically "to give."

Dr. Hoijer pointed out that the Navajos do have three ways to express "give money." The noun, peso, which they borrowed from the Spaniards, used with one verb, roughly translates "to move a round solid object competitively from one to another." This obviously involves a single coin. With another verb—"move a fabric-like object," it means a paper bill is involved. With a third verb—"move several objects"—it refers to small change.

"People who speak different languages live in distinct worlds of reality, each, to a considerable extent, organized along lines laid down by its own language," Dr. Hoijer said.

"Differences between languages are not merely different ways of labeling experiences common to all men. Instead, language functions as a guide to reality in that its words and grammatical categories classify and give meaning to the experiences of those who use it."

Dr. Hoijer, president of the American Anthropological Association, presented his views on some of the world's 3,000 languages at UCLA's Faculty Research Lecture.

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METEOROLOGY

## Upper Air Observations Aid Hurricane Forecasts

➤ UPPER AIR observations, particularly over the oceans where weather information is scarce or totally lacking, are essential to predicting hurricane paths.

This is the conclusion of five weathermen outlined in two reports to the American Meteorological Society meeting in New York. Dr. Lawrence A. Hughes of the University of Chicago said that Hurricane Carrie made three definite changes in direction during the time it steamed northward far out in the Atlantic last September. These changes, he found, were all related to shifts in the high-level, prevailing westerlies. They were related in such a manner that the likelihood of a turn could be predicted a day in advance.

The unique history of one tropical storm, the windy and rainy areas that sometimes turn into hurricanes, was detailed by four tropical weather experts. The stormy Atlantic region developed strong winds, although not the 75-mile-an-hour ones needed to qualify it as a hurricane.

Then suddenly its development ceased and its intensity decreased. Finally its intensity increased again.

Cause of this start-stop-start cycle was found high in the atmosphere. Observations made from aircraft during the period Sept. 21-23, 1957, showed a low pressure area in the upper air was the controlling factor.

At about 18,000 feet, the low, with winds in a counter-clockwise direction, was overtaking another low pressure area in the atmospheric layers near the ocean surface. When the two systems were one above the other, the surface storm could not develop.

In effect, the potential hurricane could not form because, with the two low pressure areas superimposed, the air tended to flow outward in all directions. It could not make up its "mind" where to go. When the upper air system moved on to the west, the low pressure area near the surface could then develop into the steam-engine type of circulation needed for tropical storm formation.

Drs. R. Cecil Gentry, A. W. Johnson and R. H. Simpson of the U. S. Weather Bureau's National Hurricane Research Project, West Palm Beach, Fla., and Dr. Herbert Riehl of the University of Chicago, made the studies of the tropical storm development.

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MEDICINE

## Sound May Aid in Cancer Cell Removal

➤ BEAMS of ultrahigh sound waves, 50 times as high as the human ear can hear, are being used to study cell differentiation and the possibility of future application to shedding cancer cells.

Study of cell differentiation has resulted in the successful transplantation of limb buds onto chicken hosts. These chickens grew third legs and wings, Dr. Eugene Bell, assistant professor of biology at Massachusetts Institute of Technology and an associate biologist in neurosurgery at the Massachusetts General Hospital, Boston, said.

The limb buds were first obtained by treating the outermost layer of skin with these ultrahigh frequency waves. The waves removed the layer of skin which was in turn transplanted between the skin layers of another host chicken.

This study now provides a method by which the cell differentiation process may be studied in relationship to cancer cells.

If the beams can be directed to shed the cancer cells without damaging the surrounding tissues, the effectiveness of tumor removal will be considerably increased. In slides of an embryonic tadpole exposed to these high frequency sounds the outer layer of skin was shed like a glove.

Current work shows the ultrasound beam can hit a tiny target with great accuracy and without destroying the intervening neighboring cells.

This means that it is also very useful for investigating the brain stem of the cerebellum. Methods involving electrical or surgical removal result in damage to surrounding tissue.

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# IN SCIENC

AGRICULTURE

## Temperature, Humidity Help Predict Plant Blights

➤ METEOROLOGISTS have come to the aid of the farmer, a U. S. Department of Agriculture scientist told the American Meteorological Society meeting in Kansas City, Mo.

Spread of the late blight fungus that affects tomato and potato plants can be predicted on the basis of temperature and humidity studies. If weekly weather forecasts are heeded and fungicides applied, Jack R. Wallin of Iowa State College reported, fungus damage can be reduced.

Scientists predicted spread of the fungus for a seven-day period if the mean temperature was between 60 degrees and 80 degrees Fahrenheit for ten or more hours and the relative humidity greater than 90%. Lower temperatures, held for longer periods of time, were also found to coincide with greater spread.

Just one spell of the right temperature-humidity combination per week was found to be enough for new lesions to appear on infested plants. A 21-day break between periods was expected to reduce the fungus to "subsistence level."

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TECHNOLOGY

## Tough Plastic Film Makes Drawings for the Blind

➤ A THIN tough film of polyester plastic, produced by the E. I. du Pont de Nemours & Company is now being used to produce drawings which can easily be read by the blind.

The polyester film, called Mylar, is clamped to a writing board covered with a layer of gum rubber. Raised drawings are then made on the plastic by a special inkless pen which creates a series of tiny bumps. These bumps appear as raised lines on the upper surface of the film and can be traced with the fingertips.

Other films had been tried but did not possess the required toughness and stability. They tended to tear if the pen was not used in exactly the right way.

Drawings made on Mylar can be permanently and safely stored since the plastic film does not become brittle or deteriorate with age, the company said.

Before the invention of the plastic film and rubber drawing board method, drawings for the blind were done with a tracing wheel, such as seamstresses use. This was inconvenient since it resulted in a reverse drawing.

The uses of the drawing set include the solution of geometrical problems, drawings of graphs and electrical diagrams, and the preparation of maps.

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# NCE FIELDS

PHYSIOLOGY

## Study Color Vision of Girl With One Color-Blind Eye

➤ NOW IT is possible to know how colors as seen by a color-blind person would appear to a person with normal color vision.

This was made possible when Drs. C. H. Graham and Yun Hsia of Columbia University discovered a young woman with a color-blind left eye and normal right eye.

How the world looks to her color-blind eye and to her normal eye is reported by the two psychologists in *Science* (March 28).

For her, the neutral point on the light spectrum, which looks gray to her, occurs at a wavelength of 502 millimicrons. All wavelengths of light below that point are seen by her color-blind eye as a blue equivalent to the way her normal eye sees light of about 470 millimicrons. All wavelengths above the neutral gray point appear to her color-blind eye equivalent to the way her normal eye sees a yellow of about 570 millimicrons.

Scientists distinguish several kinds of color-blindness. Most color-blind persons are called by scientists "dichromats," and the majority of dichromats confuse red with yellow and green.

Scientists divide dichromats into at least three types. "Protanopes" have less sensitivity to light at the red end of the spectrum. Another group is the "deuteranope" whose sensitivity to red is not deficient. A third type of dichromat, the "tritanope," confuses blue with green.

The girl with one color-blind eye belongs to the deuteranope type. But tests conducted by Drs. Graham and Hsia show that although her color-blind eye is sensitive to red light, it is deficient in sensitivity to the blue-green region of the spectrum.

Tests of other deuteranopes showed they, too, are deficient in sensitivity to the blue-green colors, the psychologists report.

Their findings have important implications for theories of how we are able to perceive color. They indicate that the color-blindness defect is in the eye rather than in central brain connections.

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VITAL STATISTICS

## Professionals Emigrate To U. S. to Live

➤ ALMOST 60,000 professional workers came to the United States for permanent residence between fiscal years 1953 and 1956, the National Science Foundation has reported.

More than one-fifth of the 60,000 were classified as engineers or natural scientists, including mathematicians.

Engineers constituted the largest occupational segment of the immigrants, the NSF report shows; nurses were second, and teachers of all kinds below college level were third. Physicians and surgeons were fourth and natural scientists, fifth.

The report from which these figures were drawn is entitled "Immigration of Professional Workers to the United States—1953-1956." It also shows that more than 40% of the professional group came directly from Europe, with the United Kingdom and Germany providing the largest numbers, 6,406 and 6,890 respectively.

Canada, however, outnumbered both of these countries combined as a source of immigrants, although not all the Canadian emigres were citizens of Canada. More than 15,900 professional workers crossed the border between the U. S. and Canada, the reports shows, including one-fourth of all the engineers to come to the U. S. for permanent residence during the four years covered by the report.

New York, California and Illinois were the most popular choices of the 60,000 as their destination.

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MATHEMATICS

## Coed With Math Degree Sought by Industry

➤ IF THE NATION'S schools and industries had a choice, the "Most Desirable Girl of 1958" would probably be the coed with a degree in mathematics.

Dr. Vern O. Knudsen, vice-chancellor of the University of California at Los Angeles, said "In 35 years, I have never seen such a demand for college mathematics."

The statistics back him up. Over the last three years, the number of UCLA undergraduate coeds majoring in mathematics has almost doubled, from 56 in 1954 to 104 currently enrolled. Overall enrollment for all students in the department is up 15% from last year.

But the increase is not nearly enough to satisfy the almost staggering demands of our schools and industries.

During the 1956-57 school year, the UCLA Office of Teacher Placement received 616 requests for teachers with backgrounds in mathematics. Only seven mathematics graduates, one a coed, were available to answer the demand.

Industry, although draining off the majority of mathematics graduates through more rapid promotions and salary increases than offered in teaching, faces a severe shortage of its own.

"We get a dozen or more requests for every man or woman we graduate," says Charles B. Tompkins, director of UCLA's Numerical Analysis Research, who trains coders and problem analysists for the mushrooming electronic computing field.

In other industrial and commercial fields the demand for mathematicians, as registered at the UCLA Bureau of Occupations, runs three times heavier than the available supply.

Salary discrimination against women, illegal in the California teaching profession, is rapidly disappearing in industry, as demand increases and women career mathematicians prove their professional skill.

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MEDICINE

## Anti-Cancer Neutron Amplifier Planned

➤ PLANS FOR a neutron amplifier that can be used in place of X-ray and gamma ray treatment for cancer therapy have been worked out on paper.

Neutrons have proved to be more penetrating, cause less skin damage and produce a higher biological effect in cancer cases, than either X-rays or gamma rays, Dr. Lyle Borst, professor of physics at New York University, told science writers on the annual American Cancer Society tour. (See p. 230.)

The only adequate neutron source presently available is the uranium fission reactor, which is not appropriate for hospital installation, the physicist said.

The neutron amplifier, called a convergatron, will eliminate the major headache of handling neutrons, the possibility of runaway reaction. The proposed amplifier is not susceptible to full chain reaction. With such a device, neutrons will become available at major cancer hospitals under the same conditions as X-rays, Dr. Borst pointed out.

He predicted that neutrons will be used commonly in cancer therapy within the next ten years.

The American Cancer Society has given the university physics department a grant to purchase beryllium metal, which will be studied in the university's atom smasher to evaluate the efficiency of the convergatron and to develop the now-on-paper construction plans.

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ENGINEERING

## Device Shows How New Cars Would Ride

➤ A STEERING wheel linked to an analogue computer is being used to show how new cars, still in the design stage, would behave when driven under actual road conditions.

The computer is linked to an automobile handling simulator, on which stands a miniature car that responds to various kinds of steering just as a full-size vehicle would. The computer-simulator combination gives automobile engineers the same kind of information aircraft designers obtain when they "fly" synthetic airplanes mathematically.

It was built by General Motors research staff engineers at Warren, Mich., to obtain the same kind of information about newly designed automobiles.

A vehicle moving down a highway performs certain lateral motions—yawing, rolling or sideslipping—besides its straight-ahead motion. The lateral motions result from steering displacements made by the driver.

How these affect the car's motion depend on speed, wheelbase, steering gear ratio, weight distribution, tire properties and suspension geometry, the mathematical equations for which are solved by the computer.

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AERONAUTICS

# Blueprint for Space Travel

**The blueprint for space travel has been drawn: future satellites may orbit for thousands of years and remote-controlled science stations may explore the planets.**

By ANN EWING

➤ THE BLUEPRINT for space travel by man has no timetable. But the first steps have already been taken with the tiny instrumented satellites now circling the earth.

Following further launchings of heavier satellites will come moon shoots. These lunar probes will be aimed both at hitting the moon's surface and circling the moon to take a look at its unseen side.

Next will come circling and hitting the planets, to be followed by exploration of the moon and planets using automatic sensing machines.

By then the problems of returning man safely through the earth's atmosphere will have been solved, and man will land and explore the moon for himself. Still later man will investigate the planets for himself.

These are the bold outlines of two scientific reports recently issued by two groups whose membership includes some of the nation's top scientists. One, President Eisenhower's Science Advisory Committee, is headed by Dr. James R. Killian. The other is the technical panel on the earth satellite program of the U.S. National Committee for the International Geophysical Year, a part of the National Academy of Sciences, with Dr. Richard W. Porter as chairman.

## Space Age Infancy

The IGY marked the beginning of man's real exploration of outer space. The Space Age is now less than six months old, but it is a booming baby with a very promising future.

Whereas previously instrumented rockets had spent only a total of a few hours at the fringes of the earth's atmosphere, the several satellites now in orbit have and will spend months and years there. Tomorrow's satellites may orbit thousands of years, perhaps indefinitely.

This program of scientific exploration of outer space is on an international scale. The Russian and U.S. satellites will some day be joined by those made by other nations.

What scientists are learning from these first earth-circling moonlets helps in planning later flights, but quick rocket shoots through the atmosphere and back will still be needed for some time to come. Combined with extremely high-flying and very fast airplanes, sounding rockets will be the main method for solving the problems of returning objects through the atmosphere.

Recovering packages and even animal-containing capsules from rockets, which has been done, is much less of a problem than recovering them from satellites or space ships because of the speeds involved.

To orbit the earth, a satellite must be hurled into space with a velocity of 18,000 miles an hour. Although atmospheric resistance in space is slight, it is sufficient to cause a satellite slowly to spiral toward earth to meet a fiery death when the object comes low enough. Some way must be found either to reduce this speed before the satellite hits the more dense parts of the atmosphere or to insulate the satellite's interior from the searing heat.

Fortunately much that scientists hope to learn by exploring the moon and Mars can be gathered by instruments and radioed back to earth. Therefore, the re-entry problem need not be solved before earth's space neighbors are systematically searched.

## Exploration by Remote Control

Mobile vehicles could be designed to land and crawl across the face of distant worlds, measuring, touching, looking, listening and reporting back to earth all the impressions gained. They could be remotely controlled, and thus act as hands, eyes and ears for an earth operator. Such robots could, moreover, be abandoned without a qualm when they broke down or ran out of fuel.

What scientists would like to know about the moon, besides having a look at its unseen far side, is whether or not it has a magnetic field, what its gravity or mass is, and of what its insignificant atmosphere consists. Of these, only the last would probably require landing on the moon.

The requirements for landing an instrument package gently onto the moon's surface are about equal in difficulty to those for placing the same weight of instruments on a collision course with either Mars or Venus. Only one-hundredth of one percent more velocity is needed to reach these planets than is necessary to reach the moon, but guidance and other problems differ.

Possibly the first non-lunar shoot will be to create an artificial "asteroid," a small object that would circle the sun in an orbit as planets do, but much closer than the millions of miles from earth where the natural asteroids are. This would give a precise determination of the astronomical unit, a basic unit of length in astronomy.

Using the improved value for the astronomical unit, the distances between planets in the solar system could be determined more accurately. From this, the planetary masses could be found more precisely, a necessity before space travel comes, even for unmanned vehicles.

Before actually landing on a planet, the behavior of an instrumented "re-entry body" should be observed. From a knowledge of its approach path, and a time history of altitude, deceleration and surface heating, the information necessary to design further vehicles could be determined.

To pave the way for landing on Mars and Venus by manned space ships, instrumented packages should first determine the atmospheric density, composition temperatures and winds near the surface, the kind of terrain and the composition of the crust.

Concerning the large outer planets, there may be no possibility of "landing" on their inner cores, which very possibly are not solid at all but may consist of a liquid center merging with a deep gaseous envelope. However, a vehicle might be designed to enter the planets' atmosphere, then settle to a certain density level where it would float.

For any space exploration, whether moon or planets, the most fascinating question to be answered is, "What forms of life, if any, do they have?"

The interests of human progress and national welfare demand that a long-term program of space exploration be formulated and pursued with the utmost energy. Although there will inevitably be benefits of a very practical nature from the program, the basic goal of this exploration must be the quest of knowledge about our solar system and the universe beyond.

## The Goal: Knowledge

As President Eisenhower said when his Science Advisory Committee's space report was made public, all nations "have a great responsibility to promote the peaceful use of space and to utilize the new knowledge obtainable from space science and technology for the benefit of all mankind."

One benefit to be realized in the relatively near future will be using the satellites as world-wide communication links, including intercontinental television.

Another relatively near benefit from satellites is expected in weather forecasting. Even the very simple instruments already built for early launchings will yield information not now available to meteorologists.

One instrument will show the cloud patterns over the earth. This should allow weathermen to spot large storms, including hurricanes, in their early stages, to learn more about the broad patterns of weather flow and to study the effects of mountain barriers and large bodies of water.

Another instrument will measure the total heat and visible radiation balance of the atmosphere. The sun's incoming radiation is largely in the visible part of the spectrum, while that sent into space by earth is mainly in the infrared. These radiations can be measured to determine the earth's heat budget.

Later satellites will look out into space as well as down at earth. Some day telescopes on satellites will give mankind his first clear look at the universe around him.

MEDICINE

# Virus Attacks TB Germ

➤ AN "ANTI-GERM" germ some day may be the undoing of the tough, infectious tuberculosis organism.

It is a virus that attacks the TB germ outside the body, but cannot kill it within the body.

Dr. Margret I. Sellers, Dr. Seymour Froman and Zane Price of the University of California at Los Angeles Medical School are using bacterial viruses, or phages, as research tools rather than as "germ killers" in the study of the stealthy tuberculosis germ, which has the ability to infect its host and remain undetected longer than other germs.

Dr. Sellers recently discussed some of her findings in the *Journal of the California Tuberculosis and Health Association.*

To infect a germ, the phage must attach itself to the germ cell wall by its tail, she points out. Then by means of a syringe-like action the virus squirts its nucleic acid core into the bacterium. Inside, it takes over the bacterium's reproductive apparatus and reproduces itself so prolifically that the host bursts.

Although phage can attack and destroy TB germs outside the body in this manner, inside the body blood serum and other body fluids serve as a shield that protects the germs from the virus.

Dr. Sellers has found the presence of calcium ions is necessary before the phage can attach itself to the germ wall. The calcium apparently neutralizes a repellent effect on the germ surface.

She has also found that shortly after infection by the phage the TB germ is susceptible to rupture by enzymes and sonic vibrations, which previously did not affect it.

The UCLA medical scientist emphasized the research is just scratching the surface but that the new technique should be instrumental in helping to find ways to control tuberculosis which is a major problem still in many parts of the world.

Studies are being carried out in the Nina Anderton Laboratory for Electron Microscopy.

Science News Letter, April 12, 1958

TECHNOLOGY

# Fibers Conduct Light

➤ GLASS AND plastic fibers that conduct light may replace photographic lenses and improve some medical instruments, developments in the new science of "fiber optics" at the Armour Research Foundation of Illinois Institute of Technology promise.

A Foundation scientist, Dr. Narinder S. Kapany, said present instruments for viewing inside stomachs are based on a periscope arrangement of lenses and are limited in their fields of view because they are not flexible.

Dr. Kapany said the flexibility of glass or plastic "ropes" allows them to be "navigated along curved channels" within the human body to eliminate "blind regions" and simplify examinations.

The need to insert a light bulb or light-carrying mirrored tube would be eliminated by using coarse fibers to conduct light from an outside source to illuminate the stomach. Fine fibers then would transmit a view of the stomach interior to outside the body for study by physicians. The same system also could be used for medical color photography.

The pick-up and transmission of images by plastic or glass fibers also may be used in photographing TV screens. Conventional photography suffers from large losses of light. This problem would be overcome by fiber optics. For the same reasons, he said, general color photography may be aided by fiber optics. At present, poorly lighted objects are not good color photography subjects.

One intriguing possible field of application for fiber optics mentioned by Dr. Kapany is in "cryphotography," the coding and decoding of pictures, maps and written matter by photography.

The fibers in a rope could be misaligned or improperly arranged, then used to photograph a map, Dr. Kapany said. The resulting photograph would be unintelligible to any person who might intercept it. However, if the map should reach its destination safely, it would be photographed again, through an identically misaligned fiber rope, and the final print would display the map correctly.

Science News Letter, April 12, 1958

ENGINEERING

## Radar Antennas Detect Missiles 3,000 Miles

➤ RADAR ANTENNAS that will detect enemy missiles up to 3,000 miles away can be made smaller and more efficient, using a new technique reported to the Institute of Radio Engineers meeting in New York.

Antennas for the 3,000-mile range would normally be large and unwieldy, and difficult to sweep back and forth. J. M. Flaherty and E. Kadah of Westinghouse Electric Corporation have solved the problem by having the beam moved back and forth electrically while the antenna is held in a fixed position.

This feature becomes particularly important in the extremely gusty conditions of the far northern early warning radar defense lines.

A new method of conserving power and fuel in such defense lines was described by L. P. Yeh, also of Westinghouse. He said an automatic control system has been developed that will constantly tune in on signals from another station, reducing transmitter power when favorable propagation conditions make lower power practical.

Science News Letter, April 12, 1958


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# • Books of the Week •

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AGRICOLA ON METALS—Bern Dibner—*Burndy Lib.*, 128 p., illus., paper, $2.50. An attractive book about the famous classic "De Re Metallica" by Georgius Agricola which was translated by Herbert and Lou Henry Hoover. Agricola's work was a textbook on mining and metallurgical engineering 200 years ahead of the industrial revolution.

ANALYTIC GEOMETRY—Edwin J. Purcell—*Appleton*, 289 p., $4.50. Presenting the subject as a logical system.

ANALYTICAL PHOTOGRAMMETRY — Everett L. Merritt—*Pitman*, 242 p., illus., $7.50. To aid the reader in obtaining a general geometric understanding of the basic problems of photogrammetry.

THE ARCTIC YEAR—Peter Freuchen and Finn Salomonsen — *Putnam*, 438 p., illus., $5.95. Source book on the Arctic arranged month by month. Written by an authority on the Arctic and an ornithologist and completed just before the death of Peter Freuchen.

BASIC PHYSICS—Alexander Efron—*Kider*, 692 p., illus., $7.60. Text organized "psychologically" for the beginning physics student in high school.

CONSERVATION IN THE PRODUCTION OF PETROLEUM: A Study in Industrial Control—Erich W. Zimmermann—*Yale Univ. Press*, 417 p., illus., $6. A study of a program that has been subject to much controversy.

CONTROL OF THE PLANT ENVIRONMENT—J. P. Hudson, Ed.—*Academic*, 240 p., illus., $7.50. Proceedings of the University of Nottingham (England) Fourth Easter School in Agricultural Science, 1957.

THE EFFECTS OF ATOMIC RADIATION ON OCEANOGRAPHY AND FISHERIES—Roger Revelle, Chairman—*National Academy of Sciences-National Research Council*, Publication No. 551, 137 p., graphs, $2. Summarizing present knowledge and areas of ignorance that must be taken into account in considering the biological effects of radiation.

ELEMENTARY DIFFERENTIAL EQUATIONS—Earl D. Rainville—*Macmillan*, 2d ed., 449 p., $5.50. Much of the new material in this edition is intended to arouse or increase the student's desire to continue his studies beyond the scope of this work.

ESSENTIALS OF PHYSICAL SCIENCE—John De Vries with assistance of Donald C. Boardman—*Eerdmans*, 375 p., illus., $6.95. With two objectives: To present the basic principles of physics and to place "emphasis on the relation of the basic facts of science to our commitments as Christians."

FIGURETS: More Fun With Figures—J. A. H. Hunter—*Oxford Univ. Press*, 116 p., $3.50. For those who enjoy puzzles and games involving figuring.

THE FIRST BOOK OF TROPICAL MAMMALS—Helen Hoke—*Franklin Watts*, 63 p., illus. with drawings by Helene Carter, $1.95. Telling children about exotic animals of other parts of the world.

FROM EARTHQUAKE, FIRE AND FLOOD — R. Hewitt—*Scribner*, 215 p., illus., $3.95. Against the wilder caprices of weather, the author points out, and the monumental display of natural force, our armor is still thin and our defenses weak.

GASEOUS CONDUCTORS: Theory and Engineering Applications—James Dillon Cobine—*Dover*, 606 p., illus., paper, $2.75. An unabridged republication of the first edition of 1941 with corrections by the author.

GRAPHIC METHODS IN STRUCTURAL GEOLOGY—William L. Donn and John A. Shimer—*Appleton*, 183 p., illus., $4. Primarily for the undergradute but also a reference work for the graduate student and professional geologist.

THE GROWTH OF LOGICAL THINKING FROM CHILDHOOD TO ADOLESCENCE: An Essay on the Construction of Formal Operational Structures —Bärbel Inhelder and Jean Piaget, translated by Anne Parsons and Stanley Milgram—*Basic Bks.*, 356 p., illus., $6.75. Based on firsthand observational and experimental studies with some 1,500 boys and girls.

LABORATORY STUDIES IN INTEGRATED ZOOLOGY —Cleveland P. Hickman and Frances M. Hickman—*Mosby*, 353 p., illus., paper, $3.75. For a one-year course in zoology based on three to four hours of laboratory work a week. Not emphasizing original drawings.

A MANUAL FOR NEANDERTHALS—H. Mewhinney—*Univ. of Tex. Press*, 122 p., illus., $3.50. The author assures you that with patience and this handbook you can learn to make your own stone-age implements and you can also learn to distinguish fake artifacts from the genuine article.

MINERALS YEARBOOK 1954: Volume I, Metals and Minerals (Except Fuels)—Staff, Division of Minerals—*Govt. Printing Office*, U. S. Bureau of Mines, 1419 p., graphs, $4.50. Based largely upon information obtained from mineral producers, processors and users.

MINERALS YEARBOOK 1954: Volume III, Area Reports—Field Staff, Regional Divisions of Mineral Industries—*Govt. Printing Office*, U. S. Bureau of Mines, 1179 p., graphs, $4. Includes a statistical summary chapter and one covering employment and injury data.

MOLECULAR PHYSICS: Volume 1, Number 1, January 1958—H. C. Longuet-Higgins, Ed.—*Academic*, 98 p., paper, $3.50 per part, $13.30 per year (4 issues). Founded to bring together papers on the physics of molecules, of interest to chemists as constituting the basis of chemical theory.

MORPHOLOGICAL INTEGRATION — Everett C. Olson and Robert L. Miller—*Univ. of Chicago Press*, 317 p., illus., $10. The central theme is the concept of the organism as an integrated, functional unit.

NATIONAL REGISTER OF SCHOLARSHIPS AND FELLOWSHIPS: Volume II, 1958-59 Fellowships and Grants—Juvenal L. Angel—*World Trade*, 2d ed., 232 p., $12. To serve students who must have financial assistance to continue their education.

THE PLANET JUPITER—Bertrand M. Peck—*Macmillan*, 283 p., illus., $8.50. Bringing together numerous results of observation of this largest of our planets.

THE SOURCES OF INVENTION—John Jewkes, David Sawers and Richard Stillerman—*Mac-*

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THE STORY OF HUMAN EMOTIONS: From a Teen Age Viewpoint—George M. Lott—*Philosophical Lib.*, 228 p., illus., $4.95. To give the general reader and young student basic information about mental health.

SYSTEMATIC SOCIOLOGY: An Introduction to the Study of Society—Karl Mannheim, edited by J. S. Erös and W. A. C. Stewart—*Philosophical Lib.*, 169 p., $6. Based on lectures the author gave in London after he was exiled by Hitler.

TEST METHODS WITH PLANT-REGULATING CHEMICALS—John W. Mitchell, George A. Livingston and Paul C. Marth — *Govt. Printing Office*, USDA Agriculture Handbook No. 126, 68 p., illus., paper, 40¢. A step-by-step description of experiments useful to science students, science club members and other experimenters with plants.

TIMBER RESOURCES FOR AMERICA'S FUTURE—*Govt. Printing Office*, Forest Service Forest Resource Report No. 14, 713 p., illus., $7. Showing that the United States is not faced with an acute timber shortage although there is little danger that timber will become a surplus crop.

WILD ANIMALS OF THE FAR WEST—Adrien Stoutenburg—*Parnassus*, 150 p., illus. with drawings by Ruth Robbins, $3.75. "Reading for fun" with lovely illustrations.

YOUR CHILD'S EMOTIONAL HEALTH—Anna W. M. Wolf—*Public Affairs Committee*, Public Affairs Pamphlet No. 264. 28 p., illus., paper, 25¢. To help parents in aiding their children to reach emotional security.

Science News Letter, April 12, 1958

METEOROLOGY

## Helicopter Used to Make First Mock Tornado

➤ A HELICOPTER flying low and slow was used to simulate the nation's first mock tornado in a drill that alerted the entire population of Sedgwick County, Kansas, in which Wichita is located.

The test's aim was to save lives at some future date if a real tornado strikes. The area lies in the heart of the tornado belt.

The warning network worked beautifully, Weather Bureau officials reported. The test was held April 1.

Any town can organize a local tornado reporting and warning network. Local Weather Bureau personnel cooperate with all interested groups in setting them up.

Bureau officials in Washington, D.C., say plans have also been discussed for organizing test drills for hurricanes and floods, although nothing definite is underway at the present. Aim of such drills would be the same as in the successful mock tornado test: to save lives.

Any kind of network, however, requires action by public-spirited citizens who will promptly report dangerous weather conditions to the nearest Weather Bureau office, police station or other local center.

There are certain definite rules to follow when severe weather strikes. Knowing what to do then may mean the difference between life and death.

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# Questions

MEDICINE—What are some factors that may cause spontaneous regression of tumors? p. 230.

RADIO ASTRONOMY—What is one outstanding characteristic of masers? p. 227.

TECHNOLOGY—How could fiber optics be applied to cryptography? p. 235.

*Photographs:* Cover, Grumman Aircraft Engineering Corporation; p. 227, IBM World Trade Corporation; p. 229, Bell Telephone Laboratories; p. 230, Radio Corporation of America; p. 231, General Electric Research Laboratory; p. 240, Eastman Chemical Products, Inc.

MEDICINE

## Guinea Pigs Can Learn To Have Asthma Attacks

➤ GUINEA PIGS can learn to have asthma attacks even when the substance to which they are allergic is not present.

This was reported to the American Psychosomatic Society meeting in Cincinnati, Ohio, by a group of physicians at the University of Pennsylvania School of Medicine.

When guinea pigs that had been made allergic to egg white were placed in a special chamber where they breathed an atmosphere of fine egg white mist, they became ill with clinical signs very much like those of human asthma. Not only did the asthma of the guinea pigs look like human asthma but it was similar also in X-ray and immunologic study and in response to drugs.

After the animals had had asthma attacks in the chamber for 13 days, it was found that they continued to have the attacks in the chamber even when no egg white was present.

This would appear to be an instance of "learned asthma," Drs. Perry Ottenberg, Marvin Stein and Jerry Lewis, all of the hospital of the University of Pennsylvania, concluded.

The animals who learned to have asthma under such circumstances can also forget it. After daily attacks of learned asthma for almost two weeks, the attacks became less and less intense and finally did not occur.

Further research is necessary, the doctors indicated, to ascertain that the learned asthma is really true asthma and not something else, such as a neurosis or a fear response.

Science News Letter, April 12, 1958

## *Do You Know?*

*Trilobites* disappeared more than 200,000,000 years ago but other arthropods survive in abundance.

One of the main symptoms of *pellagra,* a disease in which niacin deficiency is a prime cause, is mental disturbance.

For several years, Americans have been spending about a quarter of their disposable income on *food.*

In general, the *weather* in the U. S. moves from west to east.

# Kodak reports on:

**big deal over 0.009 roentgen . . . why they still use cellulosics in lacquer . . . color films for sophisticates**

## A modest contribution

Man comes home from work and his wife asks him what kind of a day he's had. "Same old yackety yak," he reports. "Heap-big all-afternoon powwow over the fact that whereas it used to take 0.019 roentgens of radium gamma radiation to produce a density of .05, they have now made x-ray film that takes 0.010 roentgens of gamma radiation to produce a density of .05. Cauliflower tonight again?"

•

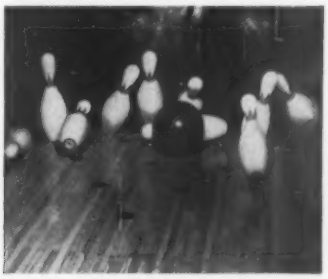
Eastman Kodak Company is pleased to announce that significant progress has been made in its continuing program of improving the sensitivity of film to ionizing radiation. One result of this program is that physicians are enabled to obtain required diagnostic information from *Kodak No-Screen Medical X-ray Film* with fully 50% less exposure of the patient to x-rays.

Another result, of interest to those engaged in industrial radiography and in the atomic energy field, is that the film badges worn to check on their body exposure to radiation can now be made capable of at least 50% more sensitivity than previously.

While it is realized that the end of the effort to reduce human exposure to radiation is nowhere in sight, it is felt that even modest technological advances in this direction serve the interests of general welfare.

*Full information about these monitoring films is obtainable from Eastman Kodak Company, Special Sensitized Products Division, Rochester 4, N. Y.*

## The polymer that steers easily



Know what looks good for the base of the lacquer to protect these things? Cellulose acetate butyrate.

Twenty-seven years of our life we have given to cellulose acetate butyrate. If you care to devote the next two or three minutes of yours to the subject, you will learn as much as a mildly interested outsider can take.

From each of the anhydroglucose units that constitute the links of the long chains of cellulose, three hydroxyl groups protrude. Hydroxyls of adjacent chains attract each other. The affinity keeps the chains packed together and thus maintains the structure of the plant tissue. This doesn't serve man's whims as well as it used to. The hydrogen bonds can be broken and the unchanged chains put into new shapes such as cellophane sheet and continuous rayon filaments. Such regenerated cellulose, however, has few parameters to play with. It does not melt. There are no volatile solvents from which it can be recovered undamaged.

To provide more room for maneuver, the next step (conceptually, if not historically) is to replace the protruding hydrogens with acetyl and butyryl groups. After drying, the product looks rather like the original wood pulp or cotton linters before the treatment with acetic and butyric acids or anhydrides. Now, however, the chains no longer cling together so. Heat them and they mobilize to a viscous liquid long before a destructive temperature is reached. They are likewise free to be separated and whirled off into liquid mobility by a grand variety of organic solvents useful in lacquers. Because of the randomness with which acetyls and butyryls have replaced the hydrogens, the lockstep is broken. Chain molecules move in small aggregates, governed by statistics. The statistics are readily adjustable in the manufacturing process. An acetyl is larger and less attractive than a hydroxyl, and a butyryl is larger and less attractive than an acetyl. Their relative proportions and the length of the molecule are subject to fine control.

Longer molecules mean higher viscosity at a given concentration; with this goes toughness of the film left after evaporation of the solvents. If you want higher solubility, lower specific gravity, better tolerance for lower-cost solvent extenders, better compatibility with resins and plasticizers, more flexibility and moisture resistance in the films, you increase the ratio of butyryl to acetyl groups. If you want more resistance to grease and assorted chemical agents, better tensile strength and hardness of the films, and higher melting point, you decrease the ratio of butyryl to acetyl. To control embrittlement during weathering, you back off and restore about one in twelve of the replaced—

*Does any of this really matter to you? If so, we shall be overjoyed to send without charge a new 75-page data book, "Cellulose Acetate Butyrate." Address Eastman Chemical Products, Inc., Kingsport, Tenn. (Subsidiary of Eastman Kodak Company). The book even tells what we have for sale in this line.*

## L is for long, S is for short

We have a refinement in the kind of color film that can be printed to gorgeous big *Type C* color prints for dry mounting or to any number of even more brilliant color transparencies, large or small. The reference is to *Kodak Ektacolor Film.* Now it comes in *Type L* for long exposures and *Type S* for short exposures.

If you were naive you would ask, "Why should I pick long exposures if I can have short exposures?" But *you* don't ask that.

*You* know that while high film sensitivity is the aim, nevertheless the departure from a strict reciprocity between the effects of illumination and exposure time is different between the three emulsion layers of a color film, leading, hitherto, to color imbalance unless the exposure time is kept within narrow prescribed limits. You therefore experience a feeling of release when we tell you that the barriers on both sides have fallen: *Type L* is balanced for exposure times from 1/5 second to 60 seconds, such as encountered in photomicrography and photomacrography; *Type S* is good down to the briefest flash of a gas discharge lamp.

*In case you have a friend who fails to grasp your explanation of the preceding paragraph and who has questions about this* Type C – Type L – Type S *business, tell him to write to Eastman Kodak Company, Professional Goods Division, Rochester 4, N. Y.*

**This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science**

Kodak

# New Machines and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 930. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

*BRUSH SPINNER is designed to clean paint brushes or rollers in a hurry. The brush is clamped to the electrical spinner, dipped in solvent and cleaned by spinning. A hand-operated model is also available.*

Science News Letter, April 12, 1958

*GARDEN POND for fish or water lilies is made of an aluminum frame and polyethylene plastic liner. The pond can be made circular, kidney-shaped or into other designs. Do-it-yourself assembled, the pond is available in four-, six- and eight-foot diameters.*

Science News Letter, April 12, 1958

*BED LAMP directs beam of light where it is wanted. Adjustable to any angle, the lamp is provided with a padded clamp to protect furniture. The reading aid is available in shades of ivory, pink, blue, maize, green and brown.*

Science News Letter, April 12, 1958

*PORTABLE PRINTER makes reproductions of everything from pencil drawings to typed or printed matter. The five- and one-half pound unit, shown in the photograph, requires a 110-volt electrical*

*outlet and can be adapted for use in automobiles, boats or planes. Copy and paper are placed in a butyrate plastic tube and exposed to a fluorescent lamp.*

Science News Letter, April 12, 1958

*PEN KIT is designed to speed up template work. Together with a fountain-barreled pen, the kit contains 12 width-set tubular nibs able to draw or match ink lines from 0.3 millimeters to 2.5 millimeters.*

Science News Letter, April 12, 1958

*SOFT-FACED ALUMINUM HAMMER can be used for a variety of purposes, from positioning heavy dies in industry to changing truck tires. The lightweight hammer is available in soft or supersoft models and in eight sizes from one-half to five pounds.*

Science News Letter, April 12, 1958

*MINIATURE TRAMPOLENE for children is designed to provide year-round fun and exercise, indoors and out. Resting only nine inches off the ground, the portable trampolene has a frame made of aluminum and a bed made of canvas. There is a safety handle bar too.*

Science News Letter, April 12, 1958

*DOUBLE BUCKET holds wash water in one compartment and rinse water in the other. Made of polyethylene plastic and available in several colors, the double bucket is 9¾ inches high and 12½ by 12½ inches wide. Each compartment holds seven quarts.*

Science News Letter, April 12, 1958

# Nature Ramblings

By BENITA TALL

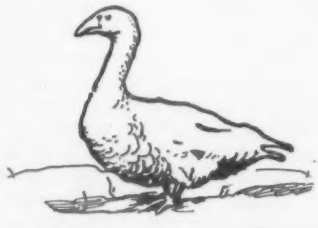
## Fussy and Sensible Eaters

➤ A GOOSE is definitely not a "silly goose" when it comes to choosing its food.

In contrast to the white-tailed deer, chased away by snow from its "free lunch counter" supplied by state wildlife workers, the goose will choose the right food—with or without snow. In one test plot planted with Kentucky fescue grass, nearly 12,000 geese fed even though there was heavy snow.

Another 108-acre plot planted to millet, milo and kaffir corn supplied more than 20,000 geese with good eating for some time in the fall. Millet was the first to go, while the geese waited for frosts to wilt the leaves of the other plants, thus exposing the grains.

Heavy January snowfall kept the deer from a tasty daily fare of alfalfa hay, dried corn on the cob and an especially prepared concentrate. When the snows came the deer



left. They moved down to the low country where they had to take "potluck."

Maybe the deer were just as wise as the geese. The free lunch was supplied through the courtesy of the South Dakota state game department which was trying to keep the deer in the back country and away from ranchers' hay and feed supplies.

Probably, however, the cottontail rabbit takes the prize for sensible eating habits.

Researchers in Massachusetts wanted to learn the effects of fertilizing land known to be lacking in certain minerals. Two test plots were established: one received a muriate of potash; the other plot was treated with calcium, nitrogen, phosphates and potassium.

The cottontail showed a three-to-one preference for the plants grown on land that received the full treatment!

Other state-sponsored studies of wildlife nutrition showed deer could feed on some plants during the winter and still starve. Chemical analyses of hemlock, mountain maple and apple twigs and leaves indicate these plants do not provide enough vitamins, minerals and carbohydrates during the winter.

The results of these different studies will point the way to getting more game per acre of land for a given amount of money.

Science News Letter, April 12, 1958